

WHAT IS CLAIMED IS:

1. A wavelength division multiplexing passive optical network (WDM PON) system comprising:

5 a central office for generating optical signals of different wavelengths, multiplexing the generated optical signals, and outputting the resultant multiplexed optical signal to an optical communication line, the central office receiving an optical signal having the same wavelengths as
10 those of the generated optical signals, and demultiplexing the received optical signal;

 a remote node for demultiplexing the optical signal transmitted from the central office via the optical communication line, and outputting the resultant demultiplexed
15 optical signals to distributed optical communication lines, respectively, the remote node multiplexing optical signals respectively transmitted from the distributed optical communication lines, and outputting the resultant multiplexed optical signal to the optical communication line; and

20 a plurality of optical network units for receiving the optical signals transmitted from the remote node via the distributed optical communication lines, respectively, each of the optical network units generating an optical signal having the same wavelength as that of the optical signal received
25 thereto, and transmitting the generated optical signal to the

remote node through an associated one of the distributed optical communication lines.

2. The WDM PON system according to claim 1, wherein the central office comprises:

a plurality of first transmitters for generating and outputting optical signals of different wavelengths, respectively;

a plurality of first receivers for receiving optical signals having the same wavelengths as those of the optical signals outputted from the first transmitters, respectively;

a first multiplexer/demultiplexer for multiplexing the optical signals respectively outputted from the first transmitters, and outputting the resultant multiplexed optical signal, the first multiplexer/demultiplexer demultiplexing the multiplexed optical signal transmitted from the remote node, and outputting the resultant demultiplexed optical signals; and

a plurality of first optical splitters for distributing the demultiplexed optical signals outputted from the first multiplexer/demultiplexer to respective first transmitters and respective second transmitters.

3. The WDM PON system according to claim 2, wherein each of the first transmitters is injection-locked by the optical signal distributed by an associated one of the first optical

splitters.

4. The WDM PON system according to claim 2, wherein the optical signals outputted from the first transmitters have the same wavelengths as those of the optical signals transmitted from the remote node, respectively.

5. The WDM PON system according to claim 1, wherein the remote node comprises:

a second multiplexer/demultiplexer for demultiplexing the multiplexed optical signal transmitted from the central office, and transmitting the resultant demultiplexed optical signals to the optical network units, respectively, the second multiplexer/demultiplexer multiplexing the optical signals respectively transmitted from the optical network units, and transmitting the resultant multiplexed optical signal to the central office.

6. The WDM PON system according to claim 1, wherein each of the optical network units comprises:

a second transmitter for generating and outputting an optical signal having the same wavelength as that of an associated one of the demultiplexed optical signals outputted from the remote node;

a second receiver for receiving the associated optical

signal outputted from the remote node; and

a second optical splitter for distributing the associated optical signal outputted from the remote node to the second transmitter and the second receiver.

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7. The WDM PON system according to claim 6, wherein the second transmitter is injection-locked by the associated optical signal distributed by the second optical splitter.

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8. The WDM PON system according to claim 6, wherein the optical signal outputted from the second transmitter has the same wavelength as that of an associated one of the optical signals generated from the central office.

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9. The WDM PON system according to claim 1, further comprising:

a bi-directional optical amplifier installed on the optical communication line.

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10. A ring type wavelength division multiplexing passive optical network (WDM PON) system comprising:

a central office including a first multiplexer/demultiplexer adapted to perform a multiplexing/demultiplexing operation for normal signals to be used in a normal state, and a second multiplexer/demultiplexer

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adapted to perform a multiplexing/demultiplexing operation
self-healing signals to be used for a self-healing purpose, the
central office generating optical signals of N different
wavelengths, each of the first and second
5 multiplexers/demultiplexers multiplexing the generated optical
signals, and transmitting the resultant multiplexed optical
signal to optical network units through a single optical fiber,
while demultiplexing a multiplexed optical signal received from
the single optical fiber, thereby detecting data generated from
10 the optical network units; and

remote nodes respectively including bi-directional
add/drop devices connected to respective optical network units,
the remote nodes establishing a ring type distribution network
in cooperation with the first and second
15 multiplexers/demultiplexers of the central office, each of the
bi-directional add/drop devices including first and second WDM
filters respectively having opposite signal travel directions,
the first WDM filter performing an add/drop operation for
associated ones of the normal signals, the second WDM filter
20 performing an add/drop operation for associated ones of the
self-healing signals.

11. The ring type WDM PON system according to claim 10,
wherein the first multiplexer/demultiplexer of the central
25 office performs the same multiplexing/demultiplexing operation

for the normal signals in both cases in which the normal signals travel in forward and backward directions, respectively.

5 12. The ring type WDM PON system according to claim 10, wherein the first multiplexer/demultiplexer of the central office performs the same multiplexing/demultiplexing operation for the self-healing signals in both cases in which the self-healing signals travel in forward and backward directions,
10 respectively.

 13. The ring type WDM PON system according to claim 10, wherein each WDM filter included in each bi-directional add/drop device drops an optical signal having a selected
15 wavelength from optical signals of N different wavelengths inputted to an input port thereof, to a drop port thereof in accordance with a reflection operation thereof, and transmits the optical signals of the remaining wavelengths through an
 output port thereof, while reversibly reflecting an optical
20 signal having the selected wavelength inputted to the drop port toward the input port to output the reflected optical signal to the central office.

 14. A bus type wavelength division multiplexing passive
25 optical network (WDM PON) system including a central office,

and a remote node connected to the central office via a single optical fiber while being connected to a plurality of optical network units via optical fibers, respectively,

wherein the central office generates optical signals of N
5 different wavelengths, multiplexes the generated optical signals through a multiplexer, transmits the resultant multiplexed optical signal to the remote node through the single optical fiber, receives a multiplexed optical signal from the remote node, and demultiplexes the received
10 multiplexed optical signal through a demultiplexer, thereby detecting data generated from the optical network units; and

wherein the remote node includes bi-directional add/drop elements connected to respective optical network units, thereby establishing a bus type distribution network, each of the bi-
15 directional add/drop elements drops an optical signal having a selected wavelength from optical signals of N different wavelengths inputted to an input port thereof, to a drop port thereof in accordance with a reflection operation thereof, and transmits the optical signals of the remaining wavelengths
20 through an output port thereof, while reversibly reflecting an optical signal having the selected wavelength inputted to the drop port toward the input port to output the reflected optical signal to the central office.

25 15. The bus type WDM PON system according to claim 10,

wherein the multiplexing/demultiplexing operation of the central office is carried out in the same manner in both cases in which optical signals travel in forward and backward directions, respectively.

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16. The bus type WDM PON system according to claim 14, wherein each of the add/drop element is a WDM thin film filter having an input port, an output port, and a drop port, the WDM thin film filter dropping an optical signal having a selected wavelength from optical signals of N different wavelengths inputted to the input port thereof, to the drop port thereof in accordance with a reflection operation thereof, and transmitting the optical signals of the remaining wavelengths through the output port thereof, while reversibly reflecting an optical signal having the selected wavelength inputted to the drop port thereof toward the input port.

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